Species: *Cystopteris montana* (Lam.) Bernh. ex Desv.
Synonym - *Filix montana* (Lam.) Underw.
Common name – mountain bladderfern

Status: Table 1 summarizes the current status of this plant by various ranking entities and defines the meaning of the status.

Table 1. Current status of *Cystopteris montana*

Entity	Status	Status Definition
NatureServe	G5	G5 - Globally secure - Common, widespread, and abundant. Perpetually secure under present conditions. Typically with considerably more than 100 occurrences and more than 10,000 individuals.
Colorado Natural Heritage Program (CNHP)	S1	S1 – State critically imperiled - critically imperiled because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation or extinction. Typically 5 or fewer occurrences or less than 1000 remaining individuals.
USDA Forest Service	None	
USDI Fish and Wildlife Service	Not listed	Not federally recognized under the Endangered Species Act (ESA) as endangered, threatened, proposed, or candidate species.

The 2012 U.S. Forest Service Planning Rule defines Species of Conservation Concern (SCC) as "a species, other than federally recognized threatened, endangered, proposed, or candidate species, that is known to occur in the plan area and for which the regional forester has determined that the best available scientific information indicates substantial concern about the species' capability to persist over the long-term in the plan area" (36 CFR 219.9). This overview was developed to summarize information relating to this species' consideration to be listed as a SCC on the Rio Grande National Forest, and to aid in the development of plan components and monitoring objectives.

Distribution, abundance, and population trend on the planning unit:

Cystopteris montana is circumboreal, occurring in the U.S. in Alaska and northwestern Montana, with disjunct populations in Colorado. In Colorado it is known from Chafee, Conejos, Grand, Gunnison, Ouray, Pitkin, San Juan and Summit Counties. It is also known from Canada, Greenland and Eurasia (Coles 2002).

There is one historical CNHP element occurrence record of *Cystopteris montana* in the planning area. The occurrence was reported in 1986 and has not been revisited. There is no data pertaining to the size or condition of the occurrence. There are 11 additional occurrences reported in Colorado outside the planning area (CNHP 2015).

USFS Corporate Database Habitat Type Associated with the Species:

The habitat for *Cystopteris montana* is described as moist, rich soil in shady spruce-fir forests, at elevations ranging from 9,000 to 11,000 feet Coles (2002) notes that the areas in which the species is found in Colorado include the most productive forest types in the southern Rocky Mountains – north-facing, wet, rich Engelmann spruce forests.

The habitat for the historical occurrence known in the planning area is described as "among rocks" at 9,020 feet, with *Cryptogramma* species as an associated species. The area is mapped as an Engelmann Spruce on Mountain Slopes Land Type Association (LTA). Other LTA's in the planning area cannot be ruled out as habitat due to the coarse scale of the mapping units (RGNF GIS data).

CNHP Ecological System of the Southern Rocky Mountains Ecoregion:

There is not enough information to identify CNHP Ecological Systems for this species.

Brief description of natural history and key ecological functions:

Cystopteris montana is described as a fern with delicate fronds arising singly from dark, cord-like creeping rhizomes (NatureServe2015). It is distinguished from other *Cystopteris* species by its broadly triangular fronds with three main branches. The Flora of North America (1993+) notes that is a terrestrial fern, occurring in wet woods or along water courses.

Little is known about the life history, demographic rates, reproductive rate or longevity of *Cystopteris montana*. It is known that it reproduces both sexually and vegetatively, utilizing long-creeping rhizomes. And it is assumed that the species has excellent medium and long-range dispersal potential because it reproduces by means of wind-dispersed spores. It is not cultivated and does not hybridize with other species of *Cystopteris* (Coles 2002)

There is insufficient knowledge about *Cystopteris montana* to determine what factors limit population growth. Population growth or establishment could be limited by inadequate genetic variability for long-term persistence, ineffective reproduction, or reduced habitat availability, as a result of human-related changes or environmental fluctuations. The rate at which colonization and establishment of new populations occurs is unknown, however it is believed that the chance of new populations becoming established is low because the amount of potential habitat is relatively small and isolated. It is unclear what type, size, intensity, or frequency of disturbance regime is important. Genetic concerns, such as the amount of genetic variability between and within the occurrences, have not been studied.

Overview of ecological conditions for recovery, conservation, and viability:

Coles (2002) stated that the habitat in Colorado includes some of the most productive forest types in the southern Rocky Mountains and that the logging of these habitats, especially near streams has declined in

the past several decades. The Flora of North America (1993) states that habitats in Colorado are being threatened by development, but no further information about that particular threat could be found.

Most of the element occurrence reports for the occurrences in Colorado (CNHP 2015) do not identify threats to the occurrences. The only report that addresses any current threats notes that trampling from recreation has occurred. One report notes that an occurrence that was formerly described as "colony recovering after near extermination by logging operations" in 1951 was described as free of evidence of disease, predation or injury in 2006 and the estimated viability of that occurrence was rated as "good" in 2007. The element occurrence report for the occurrence on the planning area does not include any information pertaining to threats to the occurrence.

Because *Cystopteris montana* grows in moist areas, specific occurrences could be threatened by any changes in hydrology that would dry out the habitat, including global climate change. However, even though the species occurs in area, Handwerk and others (2014) did not assign a climate vulnerability score for the species during their Climate Change Vulnerability Assessments conducted in 2014.

Overall, based on current information, threats to *Cystopteris montana* are considered moderate. Coles (2002) considered the species to be very vulnerable in Region 2 because the known populations in Colorado are relatively isolated and the potential habitats are extremely limited. Coles (2002) also noted that logging activity near streams in Colorado has declined, reducing some of the potential threats to *Cystopteris montana* habitat.

Key ecosystem characteristics and ecological conditions for recovery, conservation, and viability:

There is only one (historical) occurrence of this species on the RGNF, it is therefore critically important to maintain that occurrence. Presently, most threats appear to be at a relatively low and manageable level. Global climate change will likely affect all plant communities to an unknown degree over time. How this species will cope with this potential change is unknown, but, as discussed above, habitats that are sensitive to changes in the hydrology of the area are expected to respond negatively to climate change.

The RGNF should strive to maintain habitat conditions for *Cystopteris montana* by applying suggested management practices as follows:

1) Manage habitat - Manage and adjust pressures from any management influences found to be creating unacceptable impacts.

2) Manage environmental stressors - Continue assessing the RGNF's contribution to global climate change and adjust actions where permissible within the Forest Service's legal and regulatory authority. Use tools such as the Forest's Climate Change Scorecard to assess impacts and make positive changes where needed. Reductions in the RGNF's contribution to global climate change should benefit *Cystopteris montana*.

Key uncertainties and information needs/gaps:

There are a large number of information gaps and research needs for this species. Re-visiting the known occurrence, estimating current abundance, assessing imminent threats, measuring demographic parameters, studying genetic variability, and determining ecological needs and limitations are of primary

importance to further the understanding of *Cystopteris montana*. The following suggestions are ordered from inventory activities (to determine the current status) to more complex biological studies (to help understand the species)

- Re-visiting and detailed mapping of the known occurrence
- Surveying for new populations
- Addressing any imminent threats to the known occurrence
- Defining and measuring microhabitat characteristics
- Measuring demographic parameters using long-term monitoring plots
- Analyzing genetics to assess gene flow and variability throughout range

The following is an outline of a monitoring approach that could be used to inform the development of the RGNF Forest Plan revision's monitoring plan. Additionally, areas of research opportunity (beyond the scope of the Forest Plan revision) are suggested below based on key uncertainties about this species.

1) Monitoring: monitoring priority is a judgment determination based on number of occurrences, potential threats, and conservation status. The priority for this species is thought to be moderate. This is primarily due to the status being G5S1 (see Table 1) and very limited occurrences on the RGNF. Existing management practices are not known to be causing detrimental impact. Thus, monitoring is suggested as follows:

    a. Search for and document new species occurrences found on the Forest. Ensure that additional occurrences, as well as negative search results, are recorded in the appropriate electronic database. Additional occurrences increase the odds in the confidence of assessing population viability, especially with greater geographic separation. Finding additional occurrences helps inform whether additional monitoring is needed and at what intensity.

    b. Monitor the known element occurrence to document presence or absence. Evaluate each occurrence based on appropriate database protocols. Visually document the same populations every 5-7 years (twice in a planning cycle). Consider enlisting an organization such as CNHP to help develop a rapid monitoring technique that is meaningful for trend analysis but is easy to establish and simple to evaluate.

    c. Make visual observations to assess if any impacts are occurring to the known occurrence. Assess the type, source, frequency, and magnitude of the impact. Develop a strategy at the appropriate time for mitigating impacts (eliminate, move, delay, or reduce the impact).

2) Research:

    a. Reproductive biology, autecology, and demography - there are many unknowns about this species' life cycle suggesting numerous areas of potential research.

b. Genetics - an accurate estimate of this species' genetic vulnerability is unknown.

c. Disturbance - there are unknowns about the role and types of disturbance and their possible effects the species.

d. Environmental uncertainty:

    i. Continue and/or expand studies on the effects of global climate change on moisture-dependent plant communities; and specifically on *Cystopteris montana*.

Key literature:

Coles, Janet. 2002. Region 2 sensitive species evaluation form. Species: Cystopteris montana. September 28, 2002.

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Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 18+ vols. New York and Oxford.

Handwerk, J., B. Kuhn, R. Rondeau, and L. Grunau. 2014. Climate Change Vulnerability Assessment for Rare Plants of the San Juan Region of Colorado. Colorado Natural Heritage Program, Colorado State University.

NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://explorer.natureserve.org. (Accessed: October 1, 2015).

USDA Natural Resource Conservation Service (NRCS). 2015. The PLANTS Database (http://plants.usda.gov, 28 September 2015). National Plant Data Team, Greensboro, NC 27401-4901.

Map of Known Occurrences:

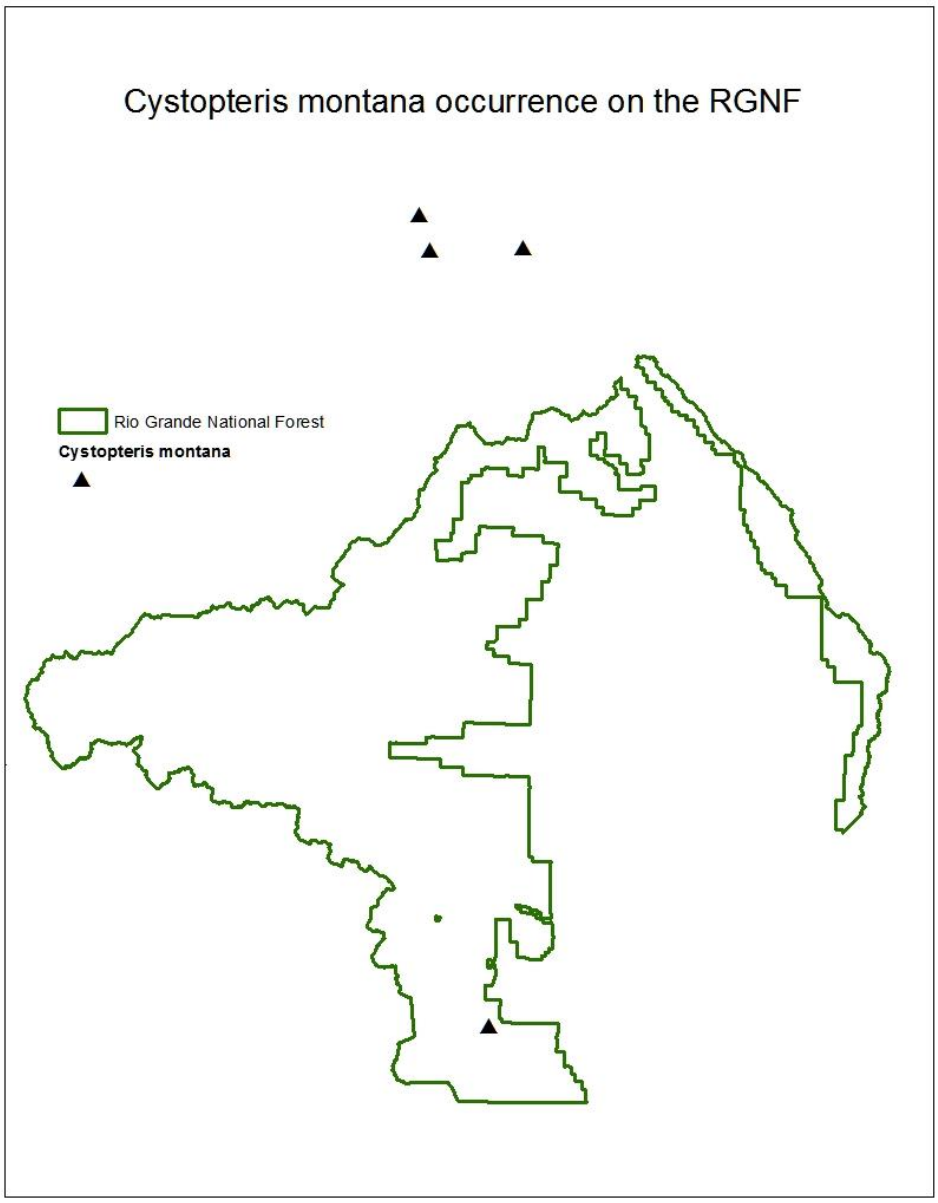

Figure 1. *Cystopteris montana* occurrence on the RGNF.